1. [An Internet of Things-based health prescription assistant and its security system design](https://www.sciencedirect.com/science/article/pii/S0167739X17314085)

[Future Generation Computer Systems](https://www.sciencedirect.com/science/journal/0167739X)Volume 82May 2018Pages 422-439

* 1. Mahmud Hossain,
  2. S. M. Riazul Islam,
  3. Farman Ali,
  4. Kyung-Sup Kwak,
  5. Ragib Hasan
  6. [Download PDF](https://www.sciencedirect.com/science/article/pii/S0167739X17314085/pdfft?md5=7012585a5bb4d1797c5c6f6fb84cb54a&pid=1-s2.0-S0167739X17314085-main.pdf)
  7. Abstract
  8. Export

Today, telemedicine has a great reputation because of its capacity to provide quality healthcare services to remote locations. To achieve its purposes, telemedicine utilizes a number of wireless technologies as well as the Internet of Things (IoT). The IoT is redefining the capacity of telemedicine in terms of improved and seamless healthcare services. In this regard, this paper contributes to the set of features of telemedicine by proposing a model for an IoT-based health prescription assistant (HPA), which helps each patient to follow the doctors recommendations properly. This paper also designs a security system that ensures user authentication and protected access to resources and services. The security system authenticates a user based on the OpenID standard. An access control mechanism is implemented to prevent unauthorized access to medical devices. Once the authentication is successful, the user is issued an authorization ticket, which this paper calls a security access token (SAT). The SAT contains a set of privileges that grants the user access to medical IoT devices and their services and/or resources. The SAT is cryptographically protected to guard against forgery. A medical IoT device verifies the SAT prior to serving a request, and thus, ensures protected access. A prototype of the proposed system has been implemented to experimentally analyze and compare the resource efficiency of different SAT verification approaches in terms of a number of performance metrics, including computation and communication overhead.

1. 

Research articleFull text access

[Type-2 fuzzy ontology–aided recommendation systems for IoT–based healthcare](https://www.sciencedirect.com/science/article/pii/S0140366417310587)

[Computer Communications](https://www.sciencedirect.com/science/journal/01403664)Volume 119April 2018Pages 138-155

* 1. Farman Ali,
  2. S. M. Riazul Islam,
  3. Daehan Kwak,
  4. Pervez Khan,
  5. K. S. Kwak
  6. [Download PDF](https://www.sciencedirect.com/science/article/pii/S0140366417310587/pdfft?md5=3df1293019be2482dd073ec073e37f51&pid=1-s2.0-S0140366417310587-main.pdf)
  7. Abstract
  8. Export

The number of people with a chronic disease is rapidly increasing, giving the healthcare industry more challenging problems. To date, there exist several ontology and IoT-based healthcare systems to intelligently supervise the chronic patients for long-term care. The central purposes of these systems are to reduce the volume of manual work in recommendation systems. However, due to the increase of risk and uncertain factors of the diabetes patients, these healthcare systems cannot be utilized to extract precise physiological information about patient. Further, the existing ontology-based approaches cannot extract optimal membership value of risk factors; thus, it provides poor results. In this regards, this paper presents a type-2 fuzzy ontology–aided recommendation systems for IoT-based healthcare to efficiently monitor the patient's body while recommending diets with specific foods and drugs. The proposed system extracts the values of patient risk factors, determines the patient's health condition via wearable sensors, and then recommends diabetes-specific prescriptions for a smart medicine box and food for a smart refrigerator. The combination of type-2 Fuzzy Logic (T2FL) and the fuzzy ontology significantly increases the prediction accuracy of a patient's condition and the precision rate for drug and food recommendations. Information about the patient's disease history, foods consumed, and drugs prescribed is designed in the ontology to deliver decision-making knowledge using Protégé Web Ontology Language (OWL)-2 tools. Semantic Web Rule Language (SWRL) rules and fuzzy logic are employed to automate the recommendation process. Moreover, Description Logic (DL) and Simple Protocol and RDF Query Language (SPARQL) queries are used to evaluate the ontology. The experimental results show that the proposed system is efficient for patient risk factors extraction and diabetes prescriptions.

1. 

Book chapter

[Chapter 4: Internet of Things–based pharmaceutics data analysis](https://www.sciencedirect.com/science/article/pii/B9780128195932000042)

[Emergence of Pharmaceutical Industry Growth with Industrial IoT Approach](https://www.sciencedirect.com/science/book/9780128195932)2020Pages 85-131

* 1. Pranshu Dhingra,
  2. N. Gayathri,
  3. S. Rakesh Kumar,
  4. Vijayakumar Singanamalla,
  5. B. Balamurugan
  6. Abstract
  7. Export

Internet of Things (IoT) helps in creating innovation in pharma industry that will benefit manufacturers and as well as patients. The purpose of pharmaceutics is to improve patients’ lives so that they can live confidently and actively with the condition they suffer from. The IoT has already made tremendous changes in the pharma industry, and the technology is still in its infancy. This chapter aims to provide the various techniques related to IoT for pharmaceutical related data and further assist in the analysis of the data generated from pharmaceutical field. The various pharmaceutical concepts based on IoT are being investigated, and the clinical data is being investigated for the body movements, and an analysis is done based on that. The analysis of the proposed system shows that it is 4% better in reducing the error rate of the results.

1. 

Book chapter

[Chapter 9: An insight of Internet of Things applications in pharmaceutical domain](https://www.sciencedirect.com/science/article/pii/B9780128195932000091)

[Emergence of Pharmaceutical Industry Growth with Industrial IoT Approach](https://www.sciencedirect.com/science/book/9780128195932)2020Pages 245-273

* 1. Sushruta Mishra,
  2. Anuttam Dash,
  3. Brojo Kishore Mishra
  4. Abstract
  5. Export

IoT (Internet of Things) refers to the interconnectivity of physical nodes (devices) embedded with actuators, sensors, network connectivity, electronics, etc., for the purpose of facilitating easy exchange of data in real-time scenario and thereby providing connectivity. Due to its applications in the practical world, IoT has the potential for completely revolutionizing the pharmaceutical industry by automating and enabling remote patient monitoring, drug discovery, its access, and much more. With the integration of IoT into the increasing digitalization in this data-centric world, the pharmaceutical area consists of an immense amount of opportunities for large-scale disruption and overhauls in the industrial sector. Today’s era demands easier and fast access to health-care services. In the same manner the companies working in the pharmaceutical sector are also supposed to ensure the secure and safe transfer of drugs, better planned shipment and delivery, and clinical consequences. In order to facilitate speedy operations, it is required to harvest data in a way that will be both effective and well-organized, supplemented by obligatory analytics. In this chapter, we have briefly described the IoT trends and methodology that are being used in the pharmaceutical sector. Various aspects revolving around the role of IoT in the pharmaceutical industry have been discussed here. A sample case study has also been highlighted in the subsequent section of the chapter. In this case study a smart system for medical nursing based on wireless sensor networks, near Field communication (NFC), and radio-frequency identification technology has been discussed. This system not only promotes nursing home conditions but also upgrades the drug supply accuracy.

1. 

Review articleFull text access

[The rise of traffic classification in IoT networks: A survey](https://www.sciencedirect.com/science/article/pii/S1084804520300126)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 15415 March 2020Article 102538

* 1. Hamid Tahaei,
  2. Firdaus Afifi,
  3. Adeleh Asemi,
  4. Faiz Zaki,
  5. Nor Badrul Anuar
  6. [Download PDF](https://www.sciencedirect.com/science/article/pii/S1084804520300126/pdfft?md5=df8f8e7acfe1a3c5b3f9542ee2f09d7a&pid=1-s2.0-S1084804520300126-main.pdf)
  7. Abstract
  8. Export

With the proliferation of the Internet of Things (IoT), the integration and communication of various objects have become a prevalent practice. The huge growth of IoT devices and different characteristics in the IoT traffic patterns have brought attention to traffic classification methods to address various raised issues in IoT applications. While network traffic classification has been well discussed in a number of surveys and review papers, it is still immature in IoT due to the differences in traffic characteristics in IoT and Non-IoT devices. This survey looks at the emerging trends of network traffic classification in IoT and the utilization of traffic classification in its applications. It also compares the legacy of traffic classification methods and presents an overview of traditional models. This paper extends the discussion with a taxonomy of the current network traffic classification within the IoT context. We then expose commercial and real-world use cases of the IoT traffic classification and finally outline open research issues and challenges in this domain.

1. 

Book chapter

[Chapter 7: Internet of Things in pharma industry: possibilities and challenges](https://www.sciencedirect.com/science/article/pii/B9780128195932000078)

[Emergence of Pharmaceutical Industry Growth with Industrial IoT Approach](https://www.sciencedirect.com/science/book/9780128195932)2020Pages 195-216

* 1. Mohan Singh,
  2. Smriti Sachan,
  3. Akansha Singh,
  4. Krishna Kant Singh
  5. Abstract
  6. Export

The Internet of Things (IoT) is a framework that comprises physical things that have sensors mounted on them. Along with the sensors, software, electronics, and Internet connectivity are also available to the things. This makes the things smart by the exchange of information with similar connected components. The IoT has massively affected numerous ventures around the world. In any case the pharmaceutical business has been fairly traditionalist in receiving innovative change, so the impacts haven’t been felt as unequivocally over the pharmaceutical and therapeutic gadget industry yet. Nonetheless, the IoT can possibly support pharma and gadget organizations improve quality yield, diminish costs, and even change how medicine is conveyed to the prescribers. Inferable from its reasonable applications, IoT holds the potential for totally reforming the pharmaceutical segment by empowering and mechanizing remote checking of patients, revelation of medications, its entrance, from which the sky is the limit. The meeting up of IoT with the expanding digitization of information in the pharmaceutical segment opens conduits of chances for huge interruption and modern updates. The advancing occasions request quicker and simpler access to medicinal services administrations. By a similar token the pharmaceutical organizations are additionally required to speed up sheltered and secure development of medications, clinical results, better directed travel, and conveyance. The requirements for quick activities, perpetually, tumble down to gathering information in a way that is both, efficient and viable, supplemented by data analytics. The most recent innovation, made accessible with the coming of IoT, can be utilized to help this change in outlook in the elements of the pharmaceutical segment. The associated innovation can be sent for covering diverse verticals; for example, producing, checking, appropriation, and control in travel. With the assistance of the continuous accessibility of information, pharmaceutical organizations can guarantee appropriate quality, while limiting or totally maintaining a strategic distance from any odds of pilferage, wastage, or creation. In this chapter the areas of application where IoT can play a significant role are discussed. But the technology brings with it some challenges also. Thus the challenges in bringing IoT in the pharma industry are also discussed.

1. 

Review articleFull text access

[An overview of the Internet of Things for people with disabilities](https://www.sciencedirect.com/science/article/pii/S1084804511002025)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 35, Issue 2March 2012Pages 584-596

* 1. Mari Carmen Domingo
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  3. Abstract
  4. Export

Currently, over a billion people including children (or about 15% of the world's population) are estimated to be living with disability. The lack of support services can make handicapped people overly dependent on their families, which prevents them from being economically active and socially included. The Internet of Things can offer people with disabilities the assistance and support they need to achieve a good quality of life and allows them to participate in the social and economic life. In this paper, an overview of the Internet of Things for people with disabilities is provided. For this purpose, the proposed architecture of the Internet of Things is introduced. Different application scenarios are considered in order to illustrate the interaction of the components of the Internet of Things. Critical challenges have been identified and addressed.

1. 

Research articleFull text access

[The contours of a human individual model based empathetic u-pillbox system for humanistic geriatric healthcare](https://www.sciencedirect.com/science/article/pii/S0167739X13002057)

[Future Generation Computer Systems](https://www.sciencedirect.com/science/journal/0167739X)Volume 37July 2014Pages 404-416

* 1. Runhe Huang,
  2. Xin Zhao,
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  5. Abstract
  6. Export

A wide range of specific health issues affects the elderly, but one particularly significant issue in geriatric healthcare is non-adherence to medication regimens, particularly among elderly patients living alone. To address this problem, a range of electronic pillbox devices has been developed. Although these may offer a partial solution to this problem by ameliorating the issue of failing memory, it is important to have a full picture of medication adherence that includes other aspects besides forgetfulness.

This article proposes an empathetic u-pillbox system that aims to overcome the shortcomings of existing systems in ensuring adherence to a medication regime and makes an effort to design a holistic elderly healthcare framework by supporting additional functionalities like providing personalized services to the elderly based on an awareness of their individual situations by placing emphases on understanding of the elderly and provision of humanistic care. This system consists of three main processes: data acquisition of the elderly situation and medicine taking state; data analysis and elderly model enhancement; and provision of empathetic services to the elderly, in which cyber-I, human model, data cycle for the spiral quality of model enhancement, knowledge fusion towards wisdom for providing smart services are our critical concepts and techniques. This article will describe the system by going through three scenarios concerning the elderly using and interacting with the proposed u-pillbox system.

Although this system is designated for geriatric healthcare, it has a potential extension to general health monitoring and care at home. Moreover, there are many potential applications in clinic or hospital medication care systems. We believe the proposed framework to be a promising approach to one of the great social challenges facing societies in the 21st century.

1. 

Research articleFull text access

[Enabling synergy in IoT: Platform to service and beyond](https://www.sciencedirect.com/science/article/pii/S1084804516302521)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 811 March 2017Pages 96-110

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  2. Gabe Fierro,
  3. David E. Culler
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  5. Abstract
  6. Export

To enable a prosperous Internet of Things (IoT), devices and services must be extensible and adapt to changes in the environment or user interaction patterns. These requirements manifest as a set of design principles for each of the layers in an IoT ecosystem, from hardware to cloud services. This paper gives concrete guidelines learned from implementing and deploying a full-stack synergistic IoT platform. We address hardware design concerns and present a reference platform, Firestorm. Upon this platform, we demonstrate firmware and personal-area networking concerns and solutions. Moving out towards larger scales we address local service discovery and syndication, and show how these principles carry through to global operation where security concerns dominate.

1. 

Book chapterFull text access

[Preface](https://www.sciencedirect.com/science/article/pii/B9780128195932000169)

[Emergence of Pharmaceutical Industry Growth with Industrial IoT Approach](https://www.sciencedirect.com/science/book/9780128195932)2020Pages xix-xxii

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  2. Vijender Kumar Solanki,
  3. Raghvendra Kumar
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  5. Export

1. 

Research articleFull text access

[DetLogic: A black-box approach for detecting logic vulnerabilities in web applications](https://www.sciencedirect.com/science/article/pii/S1084804518300225)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 1091 May 2018Pages 89-109

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  6. Abstract
  7. Export

Web applications are subject to attacks by malicious users owing to the fact that the applications are implemented by software developers with insufficient knowledge about secure programming. The implementation flaws arising due to insecure coding practices allow attackers to exploit the application in order to perform adverse actions leading to undesirable consequences. These flaws can be categorized into injection and logic flaws. As large number of tools and solutions are available for addressing injection flaws, the focus of the attackers is shifting towards exploitation of logic flaws. The logic flaws allow attackers to compromise the application-specific functionality against the expectations of the stakeholders, and hence it is important to identify these flaws in order to avoid exploitation. Therefore, a prototype called **DetLogic** is developed for detecting different types of logic vulnerabilities such as parameter manipulation, access-control, and workflow bypass vulnerabilities in web applications. DetLogic employs black-box approach, and models the intended behavior of the application as an annotated finite state machine, which is subsequently used for deriving constraints related to input parameters, access-control, and workflows. The derived constraints are violated for simulating attack vectors to identify the vulnerabilities. DetLogic is evaluated against benchmark applications and is found to work effectively.

1. 

Research articleFull text access

[Making social networks a means to save energy](https://www.sciencedirect.com/science/article/pii/S1084804514002276)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 59January 2016Pages 237-246

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  5. Abstract
  6. Export

Energy consumption in the world has increased significantly in the last few decades, becoming an important issue nowadays. The eco-aware everyday things were devised to prevent the waste of energy resources in common areas where people often elude their responsibility about the energy consumption when using appliances of collective use, like printers, coffee makers, beamers and so on. These eco-appliances are able to improve their energy efficiency dynamically adapting their operation according to their usage patterns. This work proposes a further step, also aligned with devices׳ automation, where everyday consumer devices are transformed into collaborative eco-aware everyday things. Taking advantage of the evolution of the Internet towards the Internet of Things and the Web as a universal communication mechanism both among humans-to-things and things-to-things, it is proposed to use Twitter as a communication channel for eco-aware appliances to share their usage patterns. Thus, other newly deployed similar devices in comparable environments can alleviate the cold-start problem, which is common in scenarios where usage learning is needed. To assess the effectiveness of this approach, a collaboration between three of these eco-aware devices has been simulated, giving place, encouragingly, to a higher energy reduction efficiency when compared with non-collaborative objects.

1. 

Review articleFull text access

[Intelligence in the Internet of Medical Things era: A systematic review of current and future trends](https://www.sciencedirect.com/science/article/pii/S0140366419313337)

[Computer Communications](https://www.sciencedirect.com/science/journal/01403664)Volume 15015 January 2020Pages 644-660

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  2. Muhammad Hassan Nawaz,
  3. Umit Deniz Ulusar
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  5. Abstract
  6. Export

Internet of Medical Things (IoMT) envisions a network of medical devices and people, which use wireless communication to enable the exchange of healthcare data. Healthcare costs and prices for services have been increasing with the growing population and the use of advanced technology. The combination of IoMT and healthcare can improve the quality of life, provide better care services and can create more cost-effective systems. This paper introduces the status of IoMT for healthcare industry, including research and development plans and applications. The implementation of the IoMT in healthcare has exponentially increased across the world, but still, it has many technical and design challenges. This paper depicts such challenges and shows a generic IoMT framework that consists of three main components, data acquisition, communication gateways, and servers/cloud, to meet the aforementioned challenges. Finally, this paper discusses the opportunities and prospects of IoMT in practice while emphasizing the corresponding open research issues.

1. 

Research articleFull text access

[Countering cyber threats for industrial applications: An automated approach for malware evasion detection and analysis](https://www.sciencedirect.com/science/article/pii/S1084804517303168)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 1031 February 2018Pages 249-261

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  2. Haider Abbas,
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  5. Abstract
  6. Export

The widespread adoption of Internet of Things (IoT) in industrial systems has made malware propagation more voluminous and sophisticated. Detection and prevention against these malware threats rely on automated dynamic analysis techniques. Malware writers on the other hand, are resorting towards analysis evasion techniques that pose a great deal of challenge for the malware research community. Various approaches mostly based on virtual machines or emulators have been proposed for the analysis of such envisions. However, the practicality of these approaches is still an open debate. This paper presents a malware analysis system, capable of encountering known evasion methods of malware. A novel technique for detection of malware evasive behavior is presented, which is based on measuring the deviation from normal behavior of a program or malware. Evaluations and analysis show that this approach is effective against detecting the variations in malware behavior. Moreover, countermeasures implemented by the Analysis Evasion Malware Sandbox (AEMS) are effective for large percentage of malware detection.

1. 

Review articleFull text access

[Next generation IEEE 802.11 Wireless Local Area Networks: Current status, future directions and open challenges](https://www.sciencedirect.com/science/article/pii/S0140366415003874)

[Computer Communications](https://www.sciencedirect.com/science/journal/01403664)Volume 751 February 2016Pages 1-25

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  4. Andreas Kassler
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  6. Abstract
  7. Export

A new generation of Wireless Local Area Networks (WLANs) will make its appearance in the market in the forthcoming years based on the amendments to the IEEE 802.11 standards that have recently been approved or are under development. Examples of the most expected ones are IEEE 802.11aa (Robust Audio Video Transport Streaming), IEEE 802.11ac (Very-high throughput at < 6 GHz), IEEE 802.11af (TV White Spaces) and IEEE 802.11ah (Machine-to-Machine communications) specifications. The aim of this survey is to provide a comprehensive overview of these novel technical features and the related open technical challenges that will drive the future WLAN evolution. In contrast to other IEEE 802.11 surveys, this is a use case oriented study. Specifically, we first describe the three key scenarios in which next-generation WLANs will have to operate. We then review the most relevant amendments for each of these use cases focusing on the additional functionalities and the new technologies they include, such as multi-user MIMO techniques, groupcast communications, dynamic channel bonding, spectrum databases and channel sensing, enhanced power saving mechanisms and efficient small data transmissions. We also discuss the related work to highlight the key issues that must still be addressed. Finally, we review emerging trends that can influence the design of future WLANs, with special focus on software-defined MACs and the internet-working with cellular systems.

1. 

Book chapter

[Chapter Twelve: Digital twin: The industry use cases](https://www.sciencedirect.com/science/article/pii/S006524581930049X)

[Advances in Computers](https://www.sciencedirect.com/science/bookseries/00652458)Volume 117, Issue 12020Pages 285-320

* 1. Pethuru Raj,
  2. Chellammal Surianarayanan
  3. Abstract
  4. Export

Without an iota of doubt, the well-intended digital transformation initiatives through the smart and systematic application of digitization and digitalization technologies and tools is leading to both tactical as well as strategical accomplishments across industry verticals. Worldwide enterprising businesses ought to consistently and consciously embark on various digital innovation and disruption activities in order to be ahead of their competitors in the knowledge-driven marketplace. There are a number of pioneering digital technologies emerging to speed up and streamline the activities to meet up digital transformation goals. Digital twin is perhaps one of the widely discussed and dissected digital intelligence technologies for the forthcoming era of knowledge-filled, mission-critical and people-centric services. With the faster maturity and stability of information, communication, sensing, perception, decision-making and actuation technologies, the digital twin paradigm is acquiring a lot of mind and market shares. This chapter is specially prepared and incorporated in this book to tell the prominent and dominant use cases of the fast-evolving digital twin. We have also added a number of industry use cases and benefits for unambiguously substantiating the varied claims on the future of this unique and sustainable discipline.

1. 

Review articleFull text access

[A Survey on optimized implementation of deep learning models on the NVIDIA Jetson platform](https://www.sciencedirect.com/science/article/pii/S1383762118306404)

[Journal of Systems Architecture](https://www.sciencedirect.com/science/journal/13837621)Volume 97August 2019Pages 428-442

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  3. Abstract
  4. Export

Design of hardware accelerators for neural network (NN) applications involves walking a tight rope amidst the constraints of low-power, high accuracy and throughput. NVIDIA’s Jetson is a promising platform for embedded machine learning which seeks to achieve a balance between the above objectives. In this paper, we provide a survey of works that evaluate and optimize neural network applications on Jetson platform. We review both hardware and algorithmic optimizations performed for running NN algorithms on Jetson and show the real-life applications where these algorithms have been applied. We also review the works that compare Jetson with similar platforms. While the survey focuses on Jetson as an exemplar embedded system, many of the ideas and optimizations will apply just as well to existing and future embedded systems. It is widely believed that the ability to run AI algorithms on low-cost, low-power platforms will be crucial for achieving the “AI for all” vision. This survey seeks to provide a glimpse of the recent progress towards that goal.

1. 

Research articleFull text access

[A graph-based approach for interference free integration of commercial off-the-shelf elements in pervasive computing systems](https://www.sciencedirect.com/science/article/pii/S0167739X13002999)

[Future Generation Computer Systems](https://www.sciencedirect.com/science/journal/0167739X)Volume 39October 2014Pages 3-15

* 1. Christophe Soares,
  2. Rui S. Moreira,
  3. Ricardo Morla,
  4. José Torres,
  5. Pedro Sobral
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  7. Abstract
  8. Export

Commercial off-the-shelf devices and applications are expected to be pivotal in the coming massive deployment of pervasive computing technology in home settings. The integration of these devices and applications in the same household may result in unplanned interactions involving users and entertainment, communication, and health-related devices and applications. These unplanned interactions are a serious concern when, for example, communication or entertainment applications interfere with the behavior of health-related devices. This paper presents a novel graph-based approach for representing the expected behavior of commercial off-the-shelf devices and applications, their interactions, and for detecting interference in pervasive computing systems. A set of home care scenarios is used to assess the applicability of this approach. We then provide two setups where this approach can be applied: (i) in a pre-deployment setup, where simulation is used to detect possible instances of interference, and (ii) at run-time, collecting observations from devices and applications and detecting interference as it occurs. For pre-deployment and simulation we use Opensim to recreate a home household. For run-time, we use Simple Network Management Protocol for systems state introspection and a sliding window mechanism to process the collected data-stream.

1. 

Research articleFull text access

[A gearbox model for processing large volumes of data by using pipeline systems encapsulated into virtual containers](https://www.sciencedirect.com/science/article/pii/S0167739X19316334)

[Future Generation Computer Systems](https://www.sciencedirect.com/science/journal/0167739X)Volume 106May 2020Pages 304-319

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  6. [Download PDF](https://www.sciencedirect.com/science/article/pii/S0167739X19316334/pdfft?md5=56f25eda2309a93fb56c542e0b625cf3&pid=1-s2.0-S0167739X19316334-main.pdf)
  7. Abstract
  8. Export

Software pipelines enable organizations to chain applications for adding value to contents (e.g., confidentially, reliability, and integrity) before either sharing them with partners or sending them to the cloud. However, the pipeline components add overhead when processing large volumes of data, which can become critical in real-world scenarios. This paper presents a gearbox model for processing large volumes of data by using pipeline systems encapsulated into virtual containers. In this model, the gears represent applications, whereas gearboxes represent software pipelines. This model was implemented as a collaborative system that automatically performs Gear up (by using parallel patterns) and/or Gear down (by using in-memory storage) until all gears produce uniform data processing velocities. This model reduces delays and bottlenecks produced by the heterogeneous performance of applications included in software pipelines. The new container tool capsule has been designed to encapsulate both the collaborative system and the software pipelines into a virtual container and deploy it on IT infrastructures. We conducted case studies to evaluate the performance of capsule when processing medical images and PDF repositories. The incorporation of a capsule to a cloud storage service for pre-processing medical imagery was also studied. The experimental evaluation revealed the feasibility of applying the gearbox model to the deployment of software pipelines in real-world scenarios as it can significantly improve the end-user service experience when pre-processing large-scale data in comparison with state-of-the-art solutions such as Sacbe and Parsl.

1. 

Review articleFull text access

[Applications of wireless sensor networks for urban areas: A survey](https://www.sciencedirect.com/science/article/pii/S1084804515002702)

[Journal of Network and Computer Applications](https://www.sciencedirect.com/science/journal/10848045)Volume 60January 2016Pages 192-219

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  4. Abstract
  5. Export
  6. Abstract
  7. Graphical Abstract

As new wireless technologies become more and more advance so does their expanse of applications. Among other new and innovative wireless networks, Wireless Sensor Networks (WSNs) have emerged as highly flexible and dynamic facets that are being deployed in almost every type of environment whether it is rural, suburban or urban in nature. The most adaptive and innovative research avenues are being considered in an urban environment, where WSN deployment is especially demanding due to its harsh and perverse channel conditions. We have chosen WSN deployment in an urban environment as linchpin of our research. As each application scenario is different from the other, therefore WSN solution for each application has to be adaptive and innovative. We have discussed each application of WSNs in urban areas in detail with all the problems related to it and in the end, technical solution to those problems has been discussed.

1. 

Research articleFull text access

[A safe-by-design programming language for wireless sensor networks](https://www.sciencedirect.com/science/article/pii/S1383762116000151)

[Journal of Systems Architecture](https://www.sciencedirect.com/science/journal/13837621)Volume 63February 2016Pages 16-32

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  4. Abstract
  5. Export

Wireless sensor networks are notoriously difficult to program and debug. This fact not only stems from the nature of the hardware, but also from the current approaches for developing programming languages and runtime systems for these platforms. In particular, current systems do not place enough stress on providing formal descriptions of the language and its runtime system, and on proving static properties, like type-safety and soundness. In this paper, we present the design, specification, and implementation of a programming language and a runtime system for wireless sensor networks that are safe by design. We say this in the sense that we can statically detect a large set of would-be runtime errors, and that the runtime system will not incorrectly execute an application, once the latter is deployed. We have a full prototype implementation of the system that supports SunSPOT devices, the simulation tool VisualSense, and local computer networks for fast deployment and testing of applications. Development is supported by an IDE implemented on top of the Eclipse tool that embeds both the compiler and the virtual machine seamlessly, and is used to produce software releases.

1. 

Research articleFull text access

[Dual watermarking framework for privacy protection and content authentication of multimedia](https://www.sciencedirect.com/science/article/pii/S0167739X18317096)

[Future Generation Computer Systems](https://www.sciencedirect.com/science/journal/0167739X)Volume 94May 2019Pages 654-673

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  7. Abstract
  8. Export

In the current multimedia networked infrastructure, privacy breaches due to cyber-attacks result in huge economic losses. Despite these threats there is ever increasing demand to share data over various insecure networks for accomplishment of numerous tasks. In such a scenario there is a greater need to develop new algorithms for strengthening the existing cybersecurity frameworks, ensure security, privacy, copyright protection and authentication of data. In this paper a new technique for copyright protection, data security and content authentication of multimedia images is presented. The copyright protection of the media is taken care of by embedding a robust watermark using an efficient inter-block coefficient differencing algorithm and is proposed as Scheme I. Scheme II has been utilized to ensure both copyright protection, and content authentication. The authentication of the content has been ensured by embedding a fragile watermark in spatial domain while as copyright protection has been taken care of utilizing a robust watermark. In order to thwart an adversary and ensure that it has no access to actual embedded data, we make use of a novel encryption algorithm in conjunction with Arnold transform to encrypt data prior to its embedding. The experimental results reveal that the proposed framework offers high degree of robustness against single/dual/triple attacks; with Normalized Correlation (NCC), more than or equal to 0.95. Besides, the fragile watermark embedding makes the system capable of tamper detection and localization with average BER more than 45% for all signal processing/geometric attacks. The average PSNR achieved for both schemes is greater than 41 dB. A comparison of the proposed framework with various state-of-the-art techniques demonstrate its effectiveness and superiority.

1. 

Research articleFull text access

[A specific form of cognitive rigidity following excitotoxic lesions of the basal forebrain in marmosets](https://www.sciencedirect.com/science/article/pii/030645229290241S)

[Neuroscience](https://www.sciencedirect.com/science/journal/03064522)Volume 47, Issue 2March 1992Pages 251-264

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  6. Abstract
  7. Export

The effects of *N*-methyl-d-aspartate-induced lesions of the basal forebrain were studied on performance of a series of visual discrimination tests that examined a range of cognitive functions in the marmoset. These included the ability to attend to the various dimensional properties of stimuli and to use just one of these properties in order to solve a discrimination (intra-dimensional shift); to switch attention from one dimension to another (extra-dimensional shift); to learn the reinforcement value of specific exemplars within a dimension (new learning); and to relearn their reinforcement value following reversal of the reward contingencies (serial reversals). Lesions of the basal forebrain did not impair the ability either to attend selectively to the dimensional properties of the stimuli or to switch attention from one dimension to the other. However, the lesion did affect various aspects of associative learning including a transient impairment of new learning and a marked disruption of serial reversal learning. The reversal deficit could be characterised as a tendency to perseverate on the previously correct stimulus and as a failure to to show the formation of a reversal learning set. In addition, the lesion prevented disruption of performance of a well-learned discrimination when novel exemplars from the irrelevant dimension were introduced (probe test). It is suggested that the functional effects of the basal forebrain lesion reflect impaired learning of stimulus-reward associations and behavioural rigidity. The finding, however, that there was no effect of the lesion on attentional set-shifting suggests that any loss of inhibitory control was specific to the level of stimulus-response or stimulus-reward associations, inhibitory control at the level of attentional selection remaining intact.

The similarity of the effects of damage to the basal forebrain to those seen following damage to the orbitofrontal cortex and the amygdala are discussed in the context of the close anatomical and functional relationships that exist among these three structures.

1. 

Research articleFull text access

[Localization of binding sites for calcitonin gene-related peptide in rat brain by in vitro autoradiography](https://www.sciencedirect.com/science/article/pii/0306452286901375)

[Neuroscience](https://www.sciencedirect.com/science/journal/03064522)Volume 19, Issue 4December 1986Pages 1235-1245

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  7. Abstract
  8. Export

The distribution of binding sites for calcitonin gene-related peptide (CGRP) in rat brain were studied using *in vitro* autoradiography.

In a radioreceptor assay using [125I]human calcitonin gene-related peptide as the radioligand, with cerebellar cortical membranes, rat calcitonin gene-related peptide had a binding affinity constant of1.16 ± 0.23 × 1010 *M*−1 and a site concentration of43.4 ± 3.4 fmol mg protein. In this system, human calcitonin gene-related peptide had a binding affinity constant of3.9 ± 0.7 × 109 *M*−1 whereas salmon calcitonin was very weak with a binding affinity constant of only6.8 ± 4.0 × 105 *M*−1.

CGRP binding localized by *in vitro* autoradiography, using [125I]rat calcitonin gene-related peptide. had a characteristic distinct distribution in the rat brain. There were high concentrations of binding found over the accumbens nucleus, the organum vasculosum of the lamina terminalis, ventral caudate putamen, median eminence, the arcuate nucleus, lateral amygdaloid nucleus and lateral mammillary nucleus, the superior and inferior colliculi, pontine nuclei, molecular and Purkinje cell layers of the cerebellar cortex. the nucleus of the solitary tract, the inferior olivary nuclei, hypoglossal complex and the vestibular and cochlear nuclei.

The distribution of these binding sites suggests multiple roles for CGRP in the central nervous system including auditory, visual, gustatory and somatosensory processing, and in neuroendocrine control.

1. 

Book chapter

[Chapter 1: Advances in Real-World Sensor Network System](https://www.sciencedirect.com/science/article/pii/B9780124080911000014)

[Advances in Computers](https://www.sciencedirect.com/science/bookseries/00652458)Volume 902013Pages 1-90

* 1. Debraj De,
  2. Wen-Zhan Song,
  3. Mingsen Xu,
  4. Lei Shi,
  5. Song Tan
  6. Abstract
  7. Export

Significant advancements in wireless communication, microelectronic technologies, and distributed systems have revealed the great potential of Wireless Sensor Networks (WSN) for pervasive applications. Sensor networks are being increasingly used for sensing, monitoring, and controlling in various application fields. In the past decade, sensor network technology has stimulated much research interest from the academia to the industry. The technology development is now matured to a point, where real-world and business applications are emerging, and the engineers and investors are increasingly getting involved into its development. This chapter surveys the existing state-of-the-art of real-world sensor network system designs and their application. The authors of this chapter have also described their own hands-on experience and lessons when applying the sensor network technologies in real-world application. The chapter mainly consists of survey of the practical system contributions in: (a) different layers of sensor networks (such as transport layer, network layer and link layer), (b) operating system and software development, middleware of WSN (such as network management, neighbor discovery, topology control, energy management, data storage, localization, time synchronization, and security), and (c) experience and lessons from real-world sensor network deployment and maintenance. Finally this chapter concludes with brief comments on current state of the Sensor Network technologies, its challenges and future opportunities.

[Chapter Six: Mutation Testing Advances: An Analysis and Survey](https://www.sciencedirect.com/science/article/pii/S0065245818300305)

Mike Papadakis,

Marinos Kintis,

Jie Zhang,

Yue Jia,

Mark Harman

Abstract

Mutation testing realizes the idea of using artificial defects to support testing activities. Mutation is typically used as a way to evaluate the adequacy of test suites, to guide the generation of test cases, and to support experimentation. Mutation has reached a maturity phase and gradually gains popularity both in academia and in industry. This chapter presents a survey of recent advances, over the past decade, related to the fundamental problems of mutation testing and sets out the challenges and open problems for the future development of the method. It also collects advices on best practices related to the use of mutation in empirical studies of software testing. Thus, giving the reader a “mini-handbook”-style roadmap for the application of mutation testing as experimental methodology.